

CLAIMS

1. A method for manufacturing pastas, in particular out of gluten-free raw materials, e.g., flour and/or semolina based on corn, rice, millet or barley, or out of starch, wherein the method involves the following steps:
 - a) Generating a raw material dry mixture;
 - b) Metering water into the raw material dry mixture with this raw material in motion, thereby producing a dough or moistened raw material mixture;
 - c) Metering vapor into the dough with the dough or moistened raw material in motion;
 - d) Molding the thusly obtained dough into defined dough structures; and
 - e) Drying the molded dough structures into pastas.
2. The method according to claim 1, characterized in that the raw material dry mixture is moved in step b) in a mixer, in particular a two-screw mixer.
3. The method according to claim 1, characterized in that the dough is moved in step c) in a mixer, in particular a two-screw mixer.
4. The method according to claim 3, characterized in that the vapor exposure time in the mixer during step c) measures about 10 s to 60 s, preferably 20 s to 30 s.
5. The method according to claim 1 or 2, characterized in that the moistened raw material mixture is moved in step c) on a conveyor belt, in particular a belt evaporator.

6. The method according to claim 5, characterized in that the vapor exposure time during step c) measures 30 s to 5 min.
7. The method according to one of claims 1 to 6, characterized in that at least one additive is metered into the raw material mixture.
8. The method according to claim 7, characterized in that the additive is metered into the raw material dry mixture in step a).
9. The method according to claim 7, characterized in that the additive is metered into the raw material dry mixture in step b).
10. The method according to one of claims 7 to 9, characterized in that at least one monoglyceride or one diglyceride or a hardened fat is used as the additive.
11. The method according to one of claims 1 to 4, characterized in that the vapor metered in step c) has a working pressure during evaporation of 2 bar to 5 bar.
12. The method according to one of claims 1 to 5, characterized in that vapor is metered in step c) with an initial vapor pressure of 1 bar to 10 bar.
13. The method according to one of claims 1 to 5, characterized in that vapor is metered in step c) with an initial vapor temperature of 100°C to 150°C, in particular of 100°C to 120°C.
14. The method according to one of the preceding claims, characterized in that the water metered in step b) has

a temperature of 30°C to 90°C, in particular of 75°C to 85°C.

15. The method according to one of the preceding claims, characterized in that the dough obtained in step b) has a water content of 20% to 60%, in particular of 38% to 45%.
16. The method according to one of the preceding claims, characterized in that the mass ratio of the metered water quantity to the metered vapor quantity ranges from 5:1 to 1:1, in particular from 4:1 to 2:1, most preferably measuring 3:1.
17. A system for implementing a method for the manufacture of pastas, in particular out of gluten-free raw materials, in particular for implementing a method according to claims 1 to 16, with:
 - A mixing device for generating a raw material dry mixture;
 - A water metering device (3; 3') for metering water into the raw material dry mixture;
 - A vapor metering device (6; 6') for metering vapor into the moistened raw material mixture;
 - A raw material moving device (5, 6, 10a, 10b; 10a, 10b) for moving the raw material dry mixture and moistened raw material mixture;
 - A molding device (10c) for molding the dough obtained from the raw material mixture into defined dough structures; and
 - A pasta drying device (11, 12, 13, 14) for drying the molded dough structure into pasta.
18. The system according to claim 17, characterized in that the raw material moving device has a mixer, in particular a two-screw mixer.

19. The system according to claim 17, characterized in that the raw material moving device is a conveyor belt, in particular a belt evaporator.
20. The system according to claim 18, characterized in that the mixer is a mixing kneader (10a) with a casing, a raw material supply section, a raw dough discharge section, along with at least two cooperating working shafts that extend in a conveying direction or axial direction from the raw material supply section to the raw dough discharge section within the casing, which accommodate mixing and kneading elements, along with force-conveying elements.
21. The system according to claim 20, characterized in that the area of the mixing kneader cavity upstream from its raw dough discharge section has a peristaltic dough kneading area, which has at least a respective narrowing axial cavity area, in which the free cross sectional area of the cavity between the surface of the working shafts and the inner wall of the casing as measured perpendicular to the axial direction decreases from a region with a large free cross sectional area to a region with a small free cross sectional area along the axial direction.
22. The system according to claim 20 or 21, characterized in that the mixing kneader has an area upstream from its peristaltic dough kneading area for mixing and conveying dough, in which axial areas with conveying screws and axial areas with mixing blocks are arranged on the working shafts consecutively along the conveying direction.
23. The system according to one of claims 20 to 22, characterized in that the mixing kneader preferably

has another area upstream from its peristaltic dough kneading area for tumbling or working the dough, in which tumbling and working screws are arranged on the working shafts along the conveying direction, with passages extending in an axial direction being located in their screw webs, establishing a fluidic connection between adjacent windings of a spiral.

24. The system according to claim 23, characterized in that the passages are arranged like a gap at the comb of the screw webs.
25. The system according to claim 23 or 24, characterized in that the passages are arranged like a window between the core and the comb of the screw webs.
26. The system according to one of claims 21 to 25, characterized in that the surface of the working shafts and/or that of the inner wall of the casing can be provided with an anti-adhesive layer, preferably made out of Teflon, in its peristaltic dough kneading area.
27. The system according to one of claims 18 to 26, characterized in that the raw material moving device has a dough press with an upstream mixing trough situated downstream from the two-screw mixer.
28. The system according to one of claims 18 to 26, characterized in that the raw material moving device has a single-screw extruder (10b) situated immediately downstream from the two-screw mixer (10a).
29. The system according to claim 28, characterized in that the single-screw extruder has a casing, a raw dough supply section, a dough discharge section, as well as a working shaft that extends in a conveying

direction or axial direction from the raw material supply section to the raw dough discharge section within the casing, and accommodates force-conveying elements.

30. The system according to claim 29, characterized in that the cavity of the single-screw extruder has a peristaltic dough kneading area upstream from its dough discharge section, which has at least one respective narrowing axial cavity area, in which the free cross sectional area of the cavity between the surface of the working shaft and the inner wall of the casing as measured perpendicular to the axial direction decreases from a region with a large free cross sectional area to a region with a small free cross sectional area along the axial direction.
31. The system according to one of claims 20 to 30, characterized in that the mixing kneader has a casing that can be heated to between 40°C and 100°C, preferably between 50°C and 75°C.
32. The system according to one of claims 28 to 30, characterized in that the single-screw extruder has a casing that can be heated to between 20°C and 60°C, preferably to between 40°C and 50°C.
33. The system according to one of claims 17 to 32, characterized in that molding device (10c) has a press-molding head that can be heated to between 30°C and 60°C, preferably to between 40°C and 50°C.
34. A gluten-free pasta product, in particular one manufactured according to a method based on one of claims 1 to 16, characterized in that the starch contained in the product swells from 50% to 100%, in particular 75% to 85%.

35. The pasta product according to claim 34, characterized in that the starch grains contained in the product are for the most part intact.
36. The pasta product according to claim 35, characterized in that 60% to 80% of the starch grains contained in the product are intact or have not burst.
37. The pasta product according to one of claims 34 to 36, characterized in that it has a cooking loss of less than 5% of the dry mass
38. The pasta product according to one of claims 34 to 37, characterized in that it has a fat content of less than 1% of the dry mass.
39. The pasta product according to one of claims 34 to 38, characterized in that it is made out of gluten-free raw materials like flour and/or semolina based on corn, rice, millet or barley, or of starch.
40. A method for manufacturing pastas, in particular out of gluten-free raw materials, e.g., flour and/or semolina based on corn, rice, millet or barley, or out of starch, wherein the method involves the following steps:
 - a) Generating a raw material dry mixture;
 - b) Metering water into the raw material dry mixture with this raw material in motion, thereby producing a dough or moistened raw material mixture;
 - c) Metering vapor into the dough with the dough or moistened raw material in motion;
 - d) Molding the thusly obtained dough into defined dough structures; and

- e) Processing the freshly press-molded dough structure to form so-called fresh pasta.
- 41. The system according to one of claims 17 to 33, characterized in that all steps are monitored, regulated and controlled online during the process.